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THE THRILL OF AERONAUTICS

IT is not the purpose of this article to enter into a history of aeronautics; nor is there any need for interpretation of the illustrations. These explain themselves, save that it may be noted that the white arrow on the ground in the picture "Guiding the Aviator on His Way," is intended, in a measure, to serve the same purpose for air-travelers, as does the guide-post for those who travel along the highway. Anyone who wishes a succinct and readable history and account of aeronautics, can find this in a book by Charles C. Turner, the English aviator. This book, "The Romance of Aeronautics," is an English publication, but an American edition is issued with the imprint of the J. B. Lippincott Company.

It is not easy to describe the sensation of flying. It is entirely different from that of ballooning. In a balloon the moment you leave the ground you feel absolutely motionless. It is the earth that recedes from you downward and, according to the wind, in a lateral direction. You may be travelling at sixty miles per hour, but you have no sensation of speed; there is no breath of wind in the face; the car hangs always vertically from the envelope. In is only when you touch earth again that you realise your speed, for at the moment that the car stops you feel the wind; and if it be a strong wind your repose and quietude are rudely dispelled, and your balloon, caught by the wind, heels

over and drags you along the ground.

There is no sensation of height and none of giddiness. At a great height the earth has a concave appearance, but as there is no wall or line from you to the ground the ordinary sensation of looking down a cliff is quite absent. At any considerable height also you are so far away from the ground that even if you are travelling at a very great speed it is difficult to see that you are moving at all. Supposing you are in an express train and your eyes are fixed on a distant part of the landscape; so slowly does the scene change that relatively to the swift passage of nearer objects it appears to be going in the opposite direction to them and in the same direction as the train. Thus it is in a balloon. Looking down from it, it is necessary to take a careful observation of the end of the trail-rope hanging free in the air and watch its slow passage across the map-like country, thousands of feet below, in order to note the speed.

The extent of the views obtainable from a balloon is only limited by the amount of haze or mist in the atmosphere. To a man standing on the seashore the horizon is three and one-fourth miles distant. A flag on a mast forty-five feet high and twelve miles distant appears to be on the edge of the horizon. Compare this with the following table which shows the extent of the balloonist's vision:

Height in feet	Distance of Horizon
500	30 miles
1000	42 "
2000	59 $\frac{1}{4}$ "
3000	72 $\frac{1}{2}$ "
4000	83 $\frac{3}{4}$ "
5000	93 $\frac{1}{2}$ "
1 mile	96 "

At the height of one mile, in perfectly clear weather, the balloonist can see ninety-six miles in any direction. Theoretically, the top of the Alps could be seen from an elevation of 10,000 feet over London. But the air is never so clear as to give such extensive vision. Balloonists over London, however, frequently see the sea.

As the balloonist reaches the higher altitudes, the sky becomes of a deeper blue, and the sun appears like a glaring bright disc on a dark background. Beautiful phenomena are seen by the balloonist. Halos round the sun and moon, rainbows, "glories," or "aureoles"—the coloured rings seen round the shadow cast by the balloon on the clouds—and splendid seas of rolling cloud above and below, reward his enterprise.

Dawn in cloudland is always impressive to the aeronaut. The cloud scenery begins to bestir itself, as if for his sole benefit, and to indulge in a series of wonderful groupings. Across the northeast a straight row of weird and fantastic shapes appear, black as ink against the lightening sky. They resemble gigantic trees rearing themselves from a flat land covered with white mist. These grotesque shapes seem to be the same clouds that half-an-hour before passed slowly below us, but indefinite and fleecy.

The dawn grows nearer, and a red tinge appears behind the row of cloud-trees, which become blacker and more

sharply defined. A beautiful green hue spreads above the red. To the south the clouds are bluish-grey. The stars are still very brilliant.

Almost suddenly, at about six o'clock, the row of strange trees is lifted up to a higher level. Imperceptibly the tree-clouds disappear, and a series of mysterious and ever-changing clouds take their place. One slate-grey, ponderous-looking mass occupies a giant's share of the northern sky slightly below, but with its topmost peaks and domes far above the level of the aeronaut.

It is impossible to give any idea of the immensity and variety of these changing scenes. Nothing like them could be viewed from the ground. In the south a limitless stretch of cloud-peaks look like Switzerland moulded in snow. The impression of distance conveyed by it is wonderful, and the view may extend to one hundred and fifty miles or more of clouds.

Infinite, indeed, is the variety of cloudland! Another dawn may show, across the light in the east, regiments of vapoury figures slowly stalking. It is easy to imagine these grotesque shapes inhabited by spirits akin to their weird forms. There is strange commotion in the field of grey fog. Wisps of thin cloud suddenly rise here and there, and as the light increases the cloud-shapes become better defined. Never at rest in the general movement eastward, varying currents of air carry some portions of the cloud area faster than others. There are other movements of irregular surface up and down. The woolly hillocks pass and repass each other, rise and fall before each other; and, against the background of the lightening sky, they

appear white and soft-edged like frisking lambs.

In an aeroplane, as in a balloon, there is no sense of height except that deduced from the apparent size of familiar objects. The rush of wind is ever on the face, and in cold weather it is very cold indeed. But always it is exhilarating.

Turner says that it is as easy to learn to fly as to learn to ride a bicycle; but as a blunder in a flying machine is apt to result in broken wood and wire, so it is necessary in learning to fly to proceed by comparatively cautious steps. In learning to ride a bicycle the pupil is almost from the beginning entrusted with the sole command of the machine. He cannot easily damage it or seriously hurt himself. The vast majority of cyclists have become proficient riders without doing any damage; and this can now be said also of the great majority of flight pupils. Take Turner's case, as typical of that of the average pupil. He learned to fly, and in the process did not break wood or strain a wire up to the time of obtaining his pilot's certificate—being, by the way, the fifth Englishman to do so under the

new stringent conditions imposed in 1911 by the International Aeronautical Federation. He never did more damage than could have been repaired for five shillings, and this was not due to a beginner's blunder, but was simply what a golfer would call the "fortune of the green:" it was done in a bad

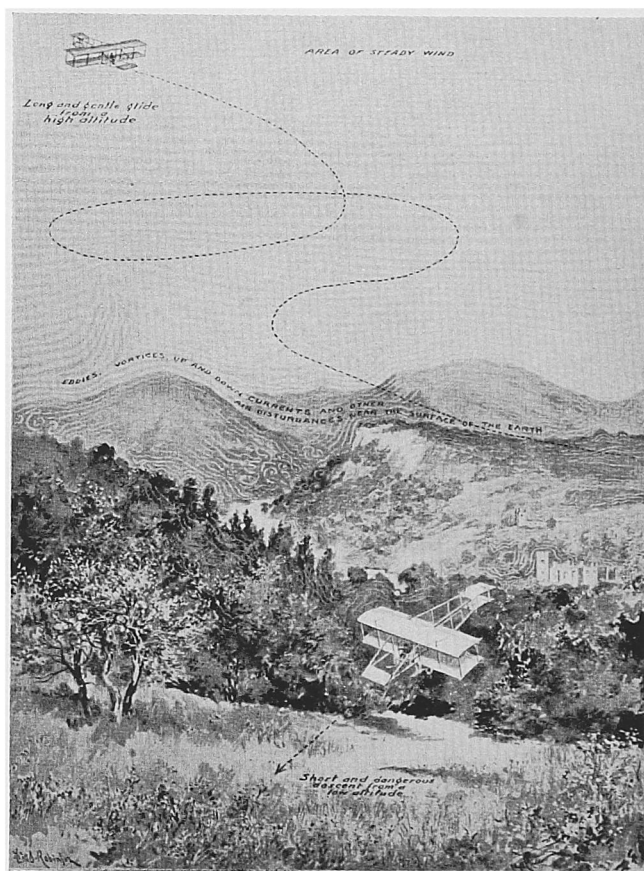
landing brought about by encountering thick fog, in which he flew perilously near to some telegraph wires and was obliged to make a quick descent.

Whether ballooning is a very valuable preparative for mechanical flight is a mooted question. But it should have some value, because to the balloonist the idea of leaving Mother Earth for an excursion into the air will have, of itself, no terrors.

That many people

are appalled at the prospect is undeniable, and it is a factor that we must take into account. But it is not reasonable; and people who would not on any inducement make a balloon or an aeroplane ascent have shown themselves indifferent to far greater risks on terra firma.

Flying has been compared to many things; but, in truth, no comparison is good. It is well, however, to correct



The Aerial Ocean
Indicating the motion of the air over uneven country

one or two common, but false, notions concerning it. There is no sense of travelling at a great height; there is not the slightest danger of giddiness. It matters not whether the aviator looks down from twenty or from two thousand feet, the sensation of height is absent. He may not be able to look down a hundred feet precipice for many seconds without being compelled to turn back from the edge, but he can look down from a balloon that is 10,000 feet above the ground for half-an-hour at a stretch without feeling a qualm.

In an aeroplane flight, when the engine starts, the noise, vibration, and sense of speed as the machine shoots forward over the ground are tremendous. Some people find them at first somewhat unnerving, but even nervous people soon get used to them. It is almost impossible to perceive the exact moment that the machine leaves the ground; only there is, with the increased speed along the ground and when flying, a rapid diminution of the noise, a swift decrease of the vibration, until the machine is simply gliding with perfect smoothness and there is nothing to inform you of the speed except the rush of wind upon the face. For as you rise from the ground it does not continue to rush beneath you, and the higher you get the slower do you appear to be moving. As to one's sensations in full flight, there is the growl of the engine, which, with use, soon becomes unnoticeable, and with this there is the steady rush of air over the planes giving forth its own peculiar music. Sometimes the machine rocks slightly laterally and in the path of flight, but the movements are as a rule very small and are corrected as soon as they

occur. Occasionally, too, the machine will seem to sink slightly and suddenly in what is known as "a hole in the wind;" and at times one hears a slight thumping as with a muffled mallet on the planes, caused by the buffeting of the air.

The pupil's lessons begin with passenger flights, followed by instructional flights during which he is allowed to place a hand upon the lever in order to feel the movements and to understand better what the pilot is doing. When he has obtained experience the time approaches for him to make his first ascent alone, which, as can readily be imagined, is a great event in his life. Having made his first solo flight, no matter how short, or how confused his feelings, the battle is more than half over. His second flight is infinitely easier, and with the third and fourth he feels quite at home in the air. From that point his progress is rapid, for there is nothing in the least difficult in the control of an aeroplane except in high wind. The ground-work was laid while the instructor was deeply imbuing him with the idea of flying and compelling him to realise, so as to make a second nature or an instinct of making all his movements very gently and nicely but also as quickly as required.

"After my sixth or seventh flight with the machine in my sole charge I was ready to fly for my certificate," writes Turner. "This, perhaps, would have been 'pressing the game' somewhat; and, as a matter of fact, it was not until I had made eleven solo flights, including the first two straight hops which are scarcely worthy of the name, that I was put through my tests. These

tests required two separate flights, each consisting of five complete figures of eight; that in one of them he attain an altitude of at least 167 feet; and that from each he land with the motor cut off and come to a halt within fifty yards of a spot previously designated. Two

of us pupils were flying for our 'brevets' on the first test, and as my fellow pupil had made two of his figures of eight before I was sent up, it was necessary to fly high in order not to embarrass him. So that in my first test I flew at a height of 700 or 800 feet. The second test took place three days later, namely, on the 23rd of April, 1911. It had been windy all day, but towards sunset the wind fell to about ten miles an hour, and I declared my intention to make

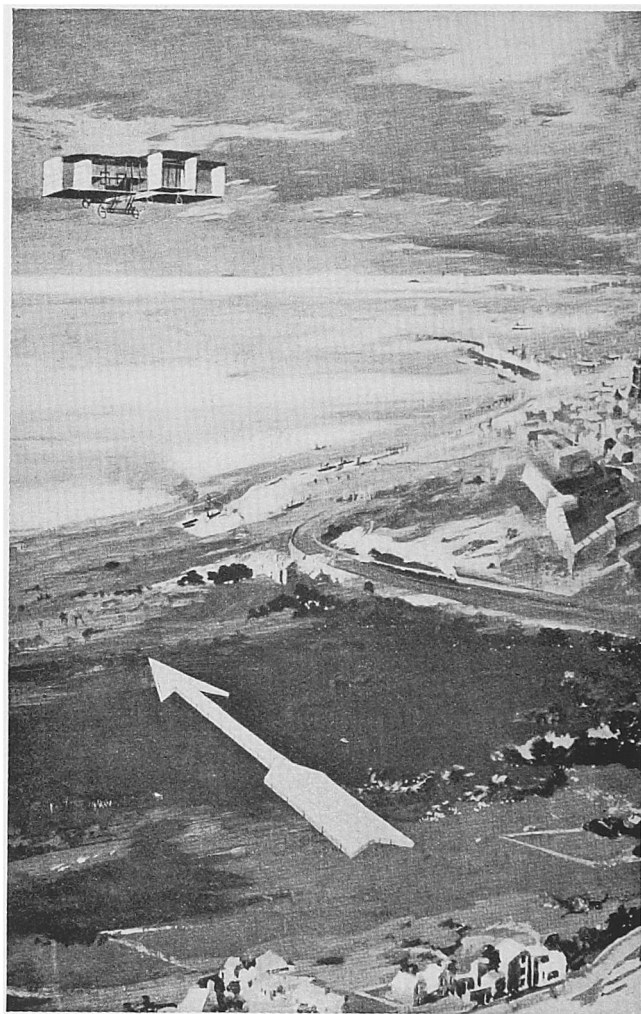
the attempt, the official of the Royal Aero Club being present and everything ready." As it gives the reader an idea of what flying in difficult conditions is like, Turner describes his final test flight at length.

He had no sooner left the ground than he realised that the wind was

stronger than it had seemed. As a matter of fact the wind was rapidly increasing. Rising against the wind just after crossing between the two mark-flags the machine almost stopped in its career. It reared up considerably and rolled from side to side, calling for

quickness and strength to keep it in even flight. He soon found that going against the wind the speed of the machine judged from familiar landmarks below, was not more than six or ten miles per hour; the wind, therefore, was about thirty miles per hour; also it was clear to him that he was to have a severe tussle; but finding that he could manage to fly, kept on, taking care to go far beyond the mark-flag before attempting to turn; for immediately the

machine had its side, and then its tail to the wind, it would be driven along at a great pace. This, of course, proved to be the case, and it was only by care that he managed to effect the turn in time to cross between the flags again. Also, with a following wind the machine had a strong ten-



Guiding the Aviator on His Way

A white arrow on the ground near the coast pointing the shortest way across the channel, and large enough to be seen from a great height

dency to come down to the ground. This, by the way, would not be the case were wind to blow in an even current of uniform velocity; nor would a machine tend to plunge upwards when flying against the wind were this the case. But all wind is made up of alternations of small and comparatively high velocity, the variation in most cases amounting to thirty per cent. of the average velocity; and this factor, taken in conjunction with the inertia of the flying machine, accounts for the phenomena mentioned, as also it accounts for at least eighty per cent. of the difficulties and dangers, such as they are, of mechanical flight. But, further, Turner found naturally that in going with the wind the speed relatively to the earth was at least seventy miles per hour, and it required considerable strength and quickness to keep her on her course. At the same time, whether flying with this strong wind abeam, or ahead, or behind, the sensation of wind on his face was unvarying, so that if he had shut his eyes, he could not have perceived whether he was flying in one direction or another relatively to the wind.

“After completing one figure of eight, taking care not to bank the machine up in turning with the wind from the outside of the turn, but taking advantage of having the wind on the inside of the turn when on the opposite side of the circle to bank the machine up considerably and so to some extent prevent the side-drifting, I decided to continue; and I was the more desirous of continuing because not only is every pupil anxious to win his certificate, but I saw my instructors, Jullerot and Collins Pizey, together with the other pupils

standing between the mark-flags, clapping their hands in encouragement every time I crossed. One figure eight was like another save in detail. I endeavoured to change my course somewhat and find out if it were possible to avoid certain difficult spots, but in each case it was necessary to make a wide detour against the wind in order to gain room enough to turn, and at the end of the eight away from the wind I was each time drifted half a mile or so out of my way. In flying against the wind I increased my altitude as much as possible in order to allow for the downward course with the wind. In the fourth eight I experienced a “side-slip.” In turning to the right with the wind on the outside, although careful not to bank the machine up on the left, the wind, nevertheless, caught it and threw the left wing up at such an angle that the machine began to slide downwards to the right. Good teaching came to my rescue. I turned the machine hard into the wind, *i. e.* to the left, and corrected the inclination by a very pronounced movement with the ailerons. After a moment my efforts had the desired result: the slip was checked with still fifty feet or so to spare, and the machine righted itself.

“The flight lasted twenty-five minutes, whereas in ordinary conditions the trial can be got into sixteen minutes with a machine of the type I was using. But I had won my brevet, and had gained experience of flying in wind which would certainly prove valuable. Also, I had gained a confidence in the machine and in flying, which were well worth the trouble.”

Wilbur Wright described the sensation of aviation as “something more

exhilarating than motoring, easier and smoother, with a movement of added dimension.

"At a height of 100 feet you feel hardly any motion at all, except for the wind which strikes your face. If you did not take the precaution to fasten your hat before starting you have probably lost it by this time. . . . You make a very short turn, yet you do not feel the sensation of being thrown from your seat, so often experienced in automobile and railway travel.

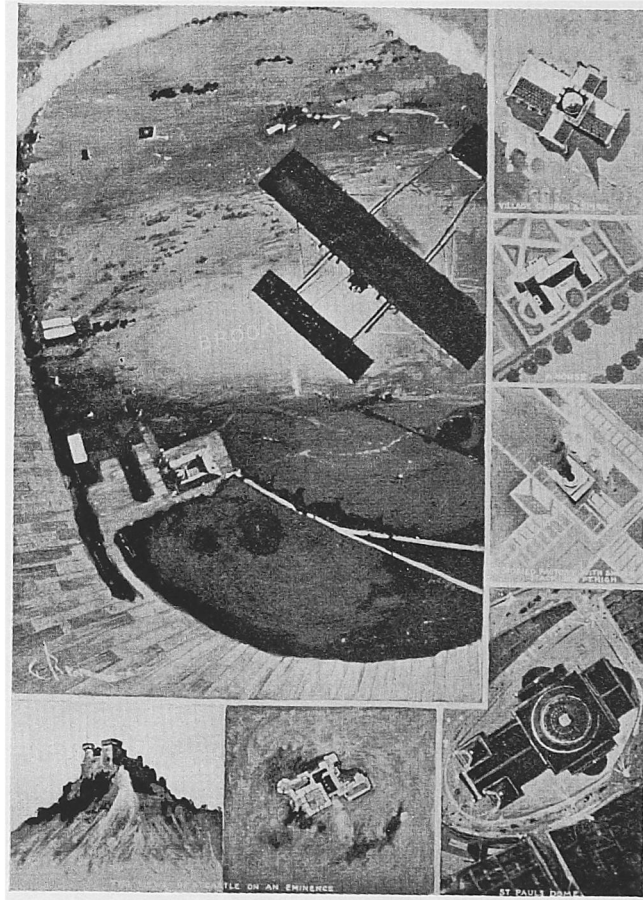
"The operator stops the motor while still in the air. . . . The motor close beside you kept up an almost deafening roar during the whole flight, yet in your excitement you did not notice it till it stopped."

Frank Hedges Butler, the founder of the Royal Aero Club described the sensation as that of skating on very clear ice and seeing with perfect clearness the bottom of the lake.

It is a remarkable fact that while the first flight across the English Channel by Blériot in July, 1909, was a tremendous achievement, and, unlike some other great deeds aeronautical, it was

immediately appreciated by the whole of Europe for its true significance, that over a hundred years before a claim was quaintly made by an Italian of a flight across the Channel. In the municipal library at Bergamo there is a curious manuscript describing an alleged flight across the Channel by an Italian

monk in 1751. There also is a printed description of this alleged flight, for the subject of the manuscript is also to be found in an old book, *The History of the Year 1751*, printed at Amsterdam at the cost of F. Pit-teri, publisher, of Venice. In other literature of the time other references are found to the same alleged flight, which was, according to one author, performed by Father Andrea Grimaldi,



Flying by Night

For the guidance of aeronauts, localities have their names in large white letters on the ground, illuminated at night. The small pictures show how strange is the appearance of familiar objects when seen from above

of Civita Vecchia, who came from the East Indies "with a marvellous machine of his invention, fashioned like an eagle riding, on which he flew from Calais to London in 1751, at the rate of six leagues an hour.

"The wings are made of catgut and whalebone, and are also covered in vellum and feathers, and each wing folds in three joints. In the body of

the machine there are contained thirty wheels of singular workmanship, two brass globes, and some small chains which alternately expand and contract; and by the aid of six vessels of brass containing quicksilver, which runs into various channels with internal divisions, the artist is able to keep the machine in equilibrium and properly balanced. Then by means of friction between a properly tempered steel wheel and a large and powerful magnet the whole machine moves forward with a regular motion, for it can either fly in a gale or in a dead calm.

“This machine is directed and guided by a tail seven spans long, which is attached to the knees and ankle of the driver by narrow leather straps, and so on by stretching his legs to the right or left he can move the machine to whichever side he likes. The head is of the most beautiful shape, and represents that of an eagle. The beak is made of horn of a peculiarly transparent kind. The eyes are of glass, and so natural that they appear to be alive as they move on their axis by means of two wires inside the beak. Eyes and beak are in continuous motion during flight. This lasts only three hours, and then the wings gradually close. When the driver perceives this he lets himself fall gently to earth upon his own feet in order to rewind the machine.

“He says that if by some ill-luck one of the wheels jammed, or the framework were to break, he would fall headlong to the ground. For this reason he does not rise much beyond the height of the trees, and he has not run the risk more than once of passing over the sea, which he did from Calais to Dover, arriving the same morning in

London, whither he said he was drawn, partly by curiosity, partly by the fame of our learned men and professors of mechanical science.

“He has already had an interview with two of the leading men in that branch of science who have seen his machine at work, and he has promised to send them by next Christmas an entire and complete set of wheels more accurately finished and not so liable to accidents, which will only occupy half the space of the old ones, with this difference into the bargain that they will work more quietly and will continue revolving on the average of six hours, so that the machine will fly at the rate of thirty miles an hour without rewinding.

“The exquisite choice of the feathers which adorn this bird surpasses the imagination and skill of the ablest painters. The most beautiful variety of colour and shade is there represented—brilliant sky-blue, gold, ruby, green, brown, and white, and these colours all blended in such delightful fashion that the like has never been seen before. The inventor recently made a flight from the Park of London to Windsor and returned thence, the whole expedition taking less than two hours. On his Majesty’s birthday he purposes to fly from the top of the Monument at the sixteenth hour, circle round the City of London, and land in the Park about the eighteenth hour. What I have told you is true, though it is not all, because time fails me. Farewell.”

Notwithstanding all these details—picturesque, like many other romances—few will doubt that Blériot was the first aviator to fly across the Channel.

Attracted by the prospect of winning undying fame and the prize of £1000 offered to the aviator who first flew across the Channel, Hubert Latham, a Frenchman, waited day after day with his Antoinette monoplane on the cliffs at Sangatte, near Calais, for calm weather suitable for the flight. His chance came at dawn on July 19th, 1909. A French torpedo-destroyer steamed out into the Channel ready to give assistance if required. Latham started just before seven o'clock, having been delayed by the fog. The attempt was doomed to failure. His motor failed him when he was no more than eight miles from the French coast, and he was forced to glide down into the water, which he did without mishap, the machine floating until the aviator was rescued.

Meanwhile Louis Blériot, the designer of the Blériot monoplane, prepared to make the attempt. His oppor-

tunity came on the following Sunday morning, July 25th, 1909, and so little expected was it by the general public that few witnessed the start and still fewer the descent. Blériot's starting-

place was Bar-raques, a small village two miles west of Calais and about four miles east of Sangatte, Latham's starting-place, where a tall chimney marks the commencement of the abandoned undertaking of the Channel tunnel. At four o'clock in the morning Blériot, who was suffering from lameness caused by an accident a few days before, ascended in his machine and made a trial flight of a few miles. Then he came down and waited for



Circling the Leaning Tower of Pisa

the sun to rise, the conditions requiring that the flight should take place between sunrise and sunset. A light breeze was blowing from the southwest when he started on his flight across twenty-one miles of sea. In clear weather the coast of England is

clearly discernible from the sand-dunes at Barraques, but on the morning of July 25th the weather was hazy. A French torpedo-boat, however, was in attendance, and she had already steamed out into the Channel when Blériot started. Describing his own sensations he said afterwards:

"I had no apprehension. The moment is supreme, yet I surprise myself by feeling no exultation. Below me is the sea, the surface disturbed by the breeze, which is now freshening. The motion of the waves beneath me is not pleasant. Within ten minutes I have passed the torpedo-boat, and I turn my head to see whether I am proceeding in the right direction; but I see nothing—neither the torpedo-boat, nor France, nor England; I am alone. For ten minutes I am lost, unguided."

It was when this episode of the voyage became known that the true nature of Blériot's feat was realised. He was, indeed, totally unprepared for such an enterprise. Having lost sight of all save sea and sky there was absolutely no means of knowing whether he was steering east, west, north, or south. Like the lost wanderer on the prairie he might have travelled constantly in a circle until weariness overcame man or machine. He says: "My hands and feet rested lightly on the levers. I let the aeroplane take its own course, and then, fifty minutes after I left France, I saw Deal, which was far to the east of the spot I intended to land upon." Near Deal Blériot saw a line of British submarines under the water accompanied by two destroyers, and he remarks, "When you are up in a balloon or aeroplane you can see very deep into the water."

Seeking Dover he flew along by the high cliffs slowly, because the wind was now almost directly opposed to him. Then, coming to a gap at St. Margaret's Bay, he found a suitable landing-place. He was seen here by only one man, a French journalist.

"The crossing of the Channel," writes Turner, "has since been shown to be an easy undertaking, but we must remember the difference between the machine and the motor used by Blériot and those of the present day. His motor, indeed, was one of most uncertain quality. Throughout the journey he was in peril, a fact of which he was perfectly aware. It was an act of heroism inspired by his enthusiasm for the conquest of the air."

On the morning after Blériot's Channel flight, Latham tried again and failed, but brilliantly. His ascent was observed by thousands of spectators, enthusiastic in spite of the rain that was falling. They saw him start and speed away at nearly twice the velocity of the Blériot monoplane. Indeed, in twenty minutes' time from the start Latham was close to the Admiralty pier at Dover. The crowds of watchers on the English coast then saw the aeroplane suddenly turn and swoop downwards. It came forward once more, and then, like a wounded bird, took a series of lurches and glided into the water. There was a race to rescue the aviator, who was found standing up in his wrecked aeroplane calmly smoking a cigarette in spite of a deep cut on his face caused by the wire of his motor goggles, which were smashed in the fall. The cause of Latham's unfortunate failure was his motor.

When the organisers of the Milan

aviation meeting of September 1910 announced a big series of prizes for a flight across the Alps, they were universally condemned for offering a temptation to competitors to risk life in order to provide spectators with a thrilling episode. The accomplishment of such a feat, it was pointed out, would not carry the new science a step further. This contention was perfectly correct. At the same time, when George Chavez accomplished the flight at the sacrifice of his life, it was impossible, in spite of the outburst of indignation and horror, not to see that he had succeeded in going far towards convincing a still partially sceptical world that humanity was destined to disport itself in the air just as it

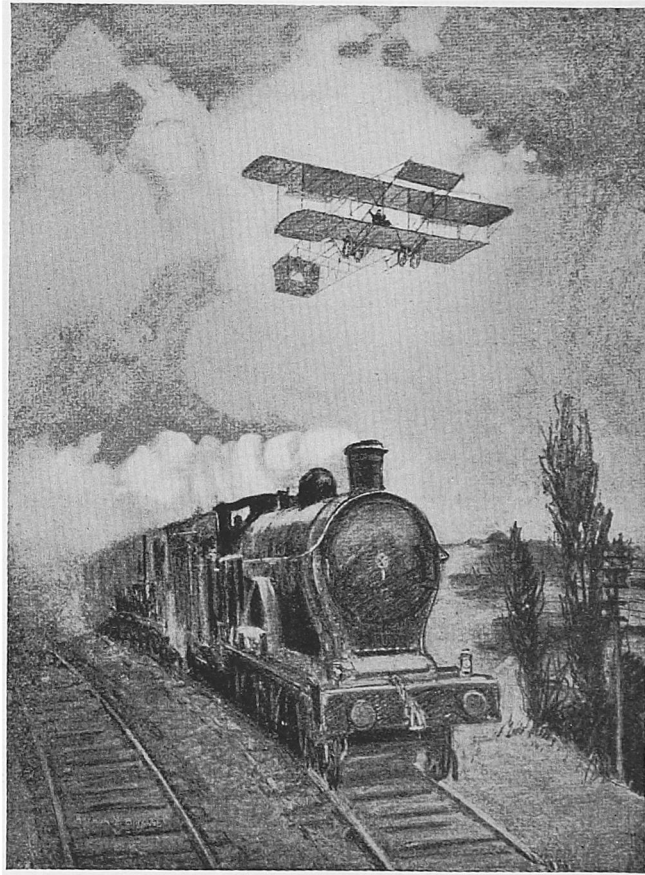
does on that equally alien element the water. The task set in the trans-Alpine competition was to fly from Brigue in Switzerland, over the Simplon Pass, across Lake Maggiore to Varese and Milan, a distance of ninety miles. Properly to appreciate the task it is necessary to remember that even by flying close to the ground competitors would have to fly as high as, at that time, any aeroplane had ever flown.

The starting-point was 3,280 feet above the sea-level, and the top of the Simplon Pass is 6,580 feet high. During the flying the Simplon Pass was closed to traffic, in order that a motor ambulance could swiftly follow the competitors. The route was marked by sheets of linen and by pillars of smoke rising

from fires of pitch. The competitors were Aubrun, Cattaneo, Chavez, and Paillette, on Blériot monoplanes; Weymann, on a Farman biplane; and Wiencziers, on an Antoinette monoplane. All the competitors used the Gnome motor. Of these competitors only Chavez dared the feat.

In mountainous country the atmosphere is generally in a disturbed condition, due to the interruption to cur-

rents of air, to the swift changes of temperature, and, in the case of the Alps, to the snow and the ice. From Brigue to Simplon Pass and thence to Lake Maggiore provided the most perilous parts of the journey. In the event of the break-down of the motor, entailing a glide to the ground, it would have been almost a miracle if with the cleverest manœuvring the most skilful pilot succeeded in avoiding dangerous rocks



Racing the London and Manchester Express

and pine forests. The end of the journey was comparatively easy, being over the lake and a flat plain.

Chavez, who had waited a week for a favourable moment to start, ascended on Friday, September 23rd, at 1.30 P. M. He was seen at various points *en route*, and a railway train in its passage across and through the Alps was stopped on the Italian side in order that the passengers might see the aviator pass. No one knows what Chavez experienced in that memorable flight. It is certain that he did not follow his intended path, which included a short-cut from Gabi to Domodossola permitted to monoplanes in the competition, but took the longer route prescribed for biplanes. From snatches of conversation permitted to him while lying wounded in hospital, it was gathered that over the Simplon Pass he encountered high winds. The aeroplane swerved from side to side, and several times narrowly escaped being dashed to pieces against great rocks. On arrival at the Domodossola valley, Chavez perceived the signals and made preparations to descend at San Diamanti. He was unable to explain the cause of the accident, which, accordingly, we must give from the accounts of eye-witnesses. On the Italian side of the Alps the aeroplane came into view soon after two o'clock. When over Domodossola it was seen to be descending, and apparently it came straight towards the landing-place, just south of the town. It is believed that the aviator misjudged the distance from the ground, for instead of coming to a nearly horizontal position for landing, his machine struck the ground head foremost at an angle of about thirty degrees, and toppled

forward and collapsed. Chavez lay for some days in a hospital, and it was hoped that he would recover, but he died on September 27th. It is said that on recovering consciousness in hospital he exclaimed: "Heaven be thanked! oh, ye Alps, ye are conquered!"

There are two theories of the accident. One is that the aviator was benumbed by the cold and could neither see nor feel clearly. Another is that something in the machine broke. In the latter case it is not improbable that cold may have been the cause.

Usually when anything goes wrong with an aeroplane in the air the aeronaut is hurt. The fall cannot be broken by any remnant of buoyancy in the contrivance. In the case of a mere stoppage of the motor there need be no serious result, because this does not affect the dynamic equilibrium of the machine, and it only means that a descent must be begun immediately at the angle of gliding of which the machine is capable. It is only serious when the aeronaut is not at a good elevation and consequently has only a small gliding radius. In other words, supposing he is at a height of 100 feet and the gliding angle of his machine is one in ten. In that case he can travel straight forward to a distance of 1000 feet before touching ground. If there is no clear landing-space for 1000 feet he will make a bad landing. If he guides his machine while gliding down and makes a turn he sacrifices some portion of his gliding radius, because a flying machine in turning cants up on one side and for the moment loses some of its lifting efficiency. There is no reason, however, why an aeronaut should not, when his engine stops,

descend in spirals in order to reach any particular spot which attracts him as a landing-place. But if his planes and steering surfaces become disorganised during flight, then, no matter how well his engine may be working, only a miracle can save him. Knowing this, what must have been the sensations of the pioneers on very imperfect machines when they found that something refused to work or heard the splitting of

but steered the machine to earth before the wings had been so impaired as to be of no further use.

That man of countless hairbreadth escapes, Santos-Dumont, had one of the most remarkable accidents on record. He was flying at St. Cyr in January, 1910, when one of the wings of his monoplane broke, through the snapping of a stay, and the machine at once plunged towards the earth. The avia-



Military Manoeuvres in Picardy

wood and fabric which meant a broken plane or rudder?

There have been two or three cases of aeroplanes catching fire in the air. In the spring of 1910 an Algerian aviator named Olieslagers was giving an exhibition of flying at Oran when the petrol of his motor in some way became ignited and the machine was soon enveloped in flames. Although in imminent danger of being burned, and, indeed, already suffering from the flames which reached his face and hands, the aviator never lost his presence of mind,

tor never left his seat, and even tried to guide the fall of the machine; but whatever he did had no effect, for during its descent the aeroplane turned three complete somersaults.

These incidents, however, pale before that which befell a mechanic in America who was experimenting with some rather clumsy devices for flying in 1909. He was a Scandinavian, named Ulysses Sorensen, and he had made a gliding machine which, in emulation of the great Montgomery's experiments, he proposed to release from a balloon

at a great height. He ascended by means of the lifting power of a balloon to a height of 3500 feet and then cut his machine adrift. He immediately discovered that the steering-rudder of his aeroplane was out of order and that he was helpless. The machine fell with great rapidity, turning over and over. When within a few hundred feet of the ground the fall was broken to some extent by the fact that the planes were then face downwards, and the machine took on a swift sidelong motion. Before it turned edge downwards the ground had been reached. The machine was smashed to pieces; but the aviator, although unconscious, was not severely injured. On regaining consciousness in half-an-hour he described his sensations as follows: "The rudder got jammed and refused to keep the aeroplane in a horizontal position. We tipped forward, and then we turned over. After that we just kept spinning over until I thought we were spinning around like a top going sideways. I didn't have time to fall out, luckily; and anyway I was braced in. It seemed to last about a month, yet I did not once think of being killed. I never thought what would happen when I hit the ground. My mind was concentrated on getting the rudder in working order again, and I was tugging at the lever all the time."

It might be imagined by people innocent of experience of aerial navigation that an aviator's work consists of an unending series of exciting and critical moments. This is altogether a wrong impression. Naturally he obtains a skill which enables him to deal lightly with situations that would find the stranger to flight wanting; but this is

true of motorists and of ship navigators also. Take, for instance, one occasional experience of flying—what is known as the "side-slip." This occurred in my own experience on one occasion when turning in a high wind, the wind blowing from the outside of the turn—*i. e.* blowing from the left during the execution of a turn to the right—I suddenly found that the left extremity of the aeroplane was being forced upwards at a very bad angle by a gust. I had been careful to avoid canting the machine up for the turn deliberately, for that is always dangerous with a wind from the outside of a turn; nevertheless, a gust caught the machine, and the aeroplane suddenly began to slip down towards the ground on my right. Such a situation always seems critical, and, indeed, is so if not quickly tackled. By turning sharply into the wind and by levering the machine up on the right, however, it was easy to recover balance with fifty feet to spare.

The impression made upon mankind by the conquest of the air is revealed in many ways; among others by the attitude of the Church. Early in 1909 the Archbishop of Paris, in the presence of a great gathering of distinguished people, made history by performing the first christening of an aeroplane at its launching. This, of course, had long been the custom in the case of marine vessels, so that it was quite natural to apply it to aerial craft. There were, as a matter of fact, two machines belonging to Delagrangé blessed by the Archbishop at Juvisy.

The Archbishop delivered the following address, after which hymns were sung:

"The Church blesses ships and rail-

ways. Why should she not bless these new ships destined to hover in aerial space? Has not God said of himself in holy writ that He rideth upon the wings of the wind? We shall ask God to favour the progress of this art, to preserve its brave pilots from accident. We shall especially ask Him that, in presence of these aerian machines, souls rising to more elevated thoughts in the higher regions of truth, goodness, and virtue may also make their ascent towards God and towards the eternal mother country. In blessing these ships we are going to give them the names chosen for them by their amiable god-mothers, 'Ile de France' and 'Alsace,'

two poles towards which French hearts must be attracted. One is the name of the province which is the heart of the country, the other that of a beloved land only lost temporarily, as he would hope, to the patrie."

But in Russia the Church apparently took another view, for an aviator having had the temerity to fly over a vil-

lage and a church, the priest with great solemnity pronounced a curse upon him.

On February 9th, 1911, the following letter appeared in the *Times*:

"SIR—Now that aviation in its balloon, airships and plane form is making remarkable progress in many countries, I beg respectfully to make what I consider a solemn suggestion.

"There is a clause in the Litany used in the Church of England which is as follows: 'That it may please Thee to preserve all that travel by land or by water.' Has not the time arrived when one may hope that the words may be altered, or rather added to, so as to read: 'That it may

please Thee to preserve all that travel by land, water, or by air?'

"May one further hope that the Archbishop of Canterbury, the Pope, and the head of the Greek Church may simultaneously give instructions for the addition to that beautiful form of prayer? If so, they would, I venture to think, be doing an act of *entente cor-*



Watchers on the Frontier
Spanish Soldiers looking up at the Aviator, on a flight from Paris to Madrid

diale throughout the Church universal.

"My suggestion cannot possibly be for one moment looked upon as 'controversial,' and so could surely be adopted without hesitation. . . ."

CHARLES DE HAVILLAND,

Rector of Crux Easton, Hants.

Flying machines have been christened with champagne, just as ships are.

As regards the future, a writer in the London *Evening Standard* says that he is rather impressed with the fact that the type of flying machine we have now is not that which is likely to prevail ultimately. The machines now are merely instruments for extraordinary feats of gymnastics in the air, and can only be controlled by quite exceptional men. It is not to the sphere of aviation as practised at present that the *Evening Standard* looks for the flying machine of the future. That is much more likely to be developed in experimental laboratories than under the stimulus of prizes and gate-money, and when it appears, may be on entirely different lines from existing aeroplanes. The time will come when flying will be the ordinary means of rapid locomotion all the world over for long distances. That is a very distant prospect—perhaps a matter of a century. There may be an enormous amount of progress in mechanical contrivances in the next few decades, but it may yet be altogether trivial in comparison with what might be done. Supposing a country had the courage to spend money in quite enormous

sums relatively to the present endowment upon research and systematic inquiry, and upon education to keep pace with the inquiry, we should, of course, very speedily make a social system altogether different from anything we had hitherto known, and altogether finer, securer, and happier. Some day or other some country will make this extraordinary plunge forward, and then all the things that trouble us at the present time will disappear automatically, and, in short, most of the miseries and troubles of life as we know them at the present time will disappear just as darkness and confusion disappear when you turn on the light.

Kipling shows us the transatlantic aerial mail of the future:

"The rudder that assured us the dominion of the unstable air and left its inventor penniless and half blind. It is calculated to Castelli's 'gull-wing' curve. Raise a few feet of that all but invisible plate three-eighths of an inch and she will yaw five miles to port or starboard ere she is under control again. Give her full helm and she returns on her track like a whip-lash. Cant the whole forward—a touch on the wheel will suffice—and she sweeps at your good direction up and down. Open the complete circle and she presents to the air a mushroom-head that will bring her up all standing within a half-mile." Nobody but Kipling could have written that. It should be an inspiration to the inventor.